CLAIMS

What is claimed is:

1 1.   A method comprising:

2   replicating a sub-graph from a first dependent graph of a first mechanical

3 design, the first dependent graph having modeling information of the first

4 mechanical design and the replicated sub-graph having modeling information of a

5 subpart of the first mechanical design;

6   merging the replicated sub-graph into a second dependent graph of a second

7 mechanical design to reuse the subpart of the first mechanical design in the second

8 mechanical design.

1 2.   The method of claim 1 further comprising receiving identification of the

2 subpart of the first mechanical design, and in response, identifying the sub-graph for

3 replication.

1 3.   The method of claim 2, wherein

2   said first dependent graph includes a first plurality of nodes correspondingly

3 represent a first plurality of design variables of the first mechanical design, and a

4 first plurality of arcs linking the first plurality of nodes in accordance with the first

5 plurality of design variables' dependency on one another, and

6   said identification of the sub-graph for replication comprises correlating said

7 received identification of the subpart to one or more nodes of said first plurality of

8 nodes directly associated with the subpart, and following applicable ones of said first

9   plurality of arcs to identify all other nodes of said first plurality of nodes to which the

10   directly associated nodes are directly or indirectly dependent on.

1   4.   The method of claim 3 wherein said replication comprises copying said

2   directly associated nodes, said nodes on which the directly associated nodes are

3   dependent on, and the arcs linking these nodes to one another.

1   5.   The method of claim 4, wherein

2   selected ones of the design variables of said replicated sub-graph are set to

3   constant values, while others are eligible to have values variably assigned; and

4   the method further comprises receiving instructions to transform selected

5   ones of the design variables set to constant values to design variables eligible for

6   having values variably assigned, or to transform selected ones of the design

7   variables eligible for having values variably assigned to having constant values

8   assigned.

1   6.   The method of claim 1 further comprising receiving identification of a point or

2   an area of the second mechanical design to reuse the subpart of the first

3   mechanical design in the second mechanical design.

1   7.   The method of claim 6, wherein

2   said second dependent graph includes a second plurality of nodes

3   correspondingly represent a second plurality of design variables of the second

4   mechanical design, and a second plurality of arcs linking the second plurality of

5   nodes in accordance with the second plurality of design variables' dependency on
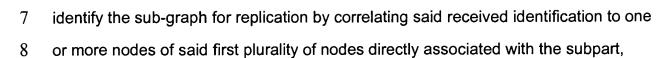
6   one another; and

7   said merging comprises correlating said received identification of the

8   point/area to one or more nodes of said second plurality of nodes directly associated

9   with the identified point/area, and attaching the replicated sub-graph to the second

10   dependent graph by selectively linking nodes of the replicated sub-graph to the

11   correlated nodes of the second dependent graph.
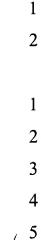
1   8.   An article of manufacture comprising:

2   a recordable medium having recorded thereon a plurality of programming

3   instructions for use to program an apparatus to enable the apparatus to be able to

4   replicate a sub-graph from a first dependent graph of a first mechanical design, the

5   first dependent graph having modeling information of the first mechanical design

6   and the replicated sub-graph having modeling information of a subpart of the first

7   mechanical design, and to be able to merge the replicated sub-graph into a second

8   dependent graph of a second mechanical design to reuse the subpart of the first

9   mechanical design in the second mechanical design.

1   9.   The article of claim 8, wherein the programming instructions further enable

2   the apparatus to be able to receive identification of the subpart of the first

3   mechanical design, and in response, identify the sub-graph for replication.

1   10.   The article of claim 9, wherein

2   said first dependent graph includes a first plurality of nodes correspondingly

3   represent a first plurality of design variables of the first mechanical design, and a

4   first plurality of arcs linking the first plurality of nodes in accordance with the first

5   plurality of design variables' dependency on one another; and

6   the programming instructions further enable the apparatus to be able to

7   identify the sub-graph for replication by correlating said received identification to one

8   or more nodes of said first plurality of nodes directly associated with the subpart,

9   and then following applicable ones of said first plurality of arcs to identify all other

10   nodes of said first plurality of nodes to which the directly associated nodes are

11   directly or indirectly dependent on.

1   11.   The article of claim 10 wherein the programming instructions further enable

2   the apparatus to be able to replicate the identified sub-graph by copying said directly

3   associated nodes, said nodes the directly associated nodes are dependent on, and

4   the arcs linking these nodes to one another.

1   12.   The article of claim 11, wherein

2   selected ones of the design variables of said replicated sub-graph are set to

3   constant values, while others are eligible to have values variably assigned; and

4   the programming instructions further enable the apparatus to be able to

5   receive instructions to transform selected ones of the design variables set to

6   constant values to design variables eligible for having values variably assigned, or to

7   transform selected ones of the design variables eligible for having values variably

8   assigned to having constant values assigned.

1   13.   The article of claim 8, wherein the programming instructions further enable

2   the apparatus to be able to receive identification of a point or an area of the second

3   mechanical design to reuse the subpart of the first mechanical design in the second

4   mechanical design.

1   14.   The article of claim 13, wherein

2   said second dependent graph includes a second plurality of nodes

3   correspondingly represent a second plurality of design variables of the second

4   mechanical design, and a second plurality of arcs linking the second plurality of

5   nodes in accordance with the second plurality of design variables' dependency on

6   one another; and

7   the programming instructions further enable the apparatus to be able to

8   correlate the received identification of the point/area to one or more nodes of said

9   second plurality of nodes directly associated with the identified point/area, and to

10   attach the replicated sub-graph to the second dependent graph by selectively linking

11   nodes of the replicated sub-graph to the correlated nodes of the second dependent

12   graph.

1   15.   The article of claim 8, wherein the programming instructions are integral part

2   of a computer aided design tool.

1   16.   An apparatus comprising:

2   at least one storage medium having stored therein a first and a second

3   plurality of programming instructions; and

4   at least one processor coupled to the at least on storage medium to execute

5   the first plurality of programming instructions to replicate a sub-graph from a first

6   dependent graph of a first mechanical design, the first dependent graph having

7   modeling information of the first mechanical design and the replicated sub-graph

8   having modeling information of a subpart of the first mechanical design, and to

9   execute the second plurality of programming instructions to merge the replicated

10   sub-graph into a second dependent graph of a second mechanical design to reuse

11   the subpart of the first mechanical design in the second mechanical design.

1   17.   The apparatus of claim 16, wherein the at least one processor further

2   executes the second plurality of programming instructions to receive identification of

3   the subpart of the first mechanical design, and in response, identify the sub-graph

4   for replication.

1   18.   The apparatus of claim 17, wherein

2   said first dependent graph includes a first plurality of nodes correspondingly

3   represent a first plurality of design variables of the first mechanical design, and a

4   first plurality of arcs linking the first plurality of nodes in accordance with the first

5   plurality of design variables' dependency on one another; and

6   the at least one processor further executes the first plurality of programming

7   instructions to identify the sub-graph for replication by correlating said received

8   identification of the subpart to one or more nodes of said first plurality of nodes

9   directly associated with the identified subpart, and to follow applicable ones of said

10   first plurality of arcs to identify all other nodes of said first plurality of nodes to which

11   the directly associated nodes are directly or indirectly dependent on.

1   19.   The apparatus of claim 18 wherein the at least one processor further

2   executes the first plurality of programming instructions to replicate the identified sub-

3   graph by copying said directly associated nodes, said nodes on which the directly

4   associated nodes are dependent on, and the arcs linking the these nodes to one

5   another.

1   20.   The apparatus of claim 19, wherein

2   selected ones of the design variables of said replicated sub-graph are set to

3 constant values, while others are eligible to have values variably assigned; and

4   the at least one processor further executes the second plurality of

5 programming instructions to receive instructions to transform selected ones of the

6 design variables set to constant values to design variables eligible for having values

7 variably assigned, or to transform selected ones of the design variables eligible for

8 having values variably assigned to having constant values assigned.
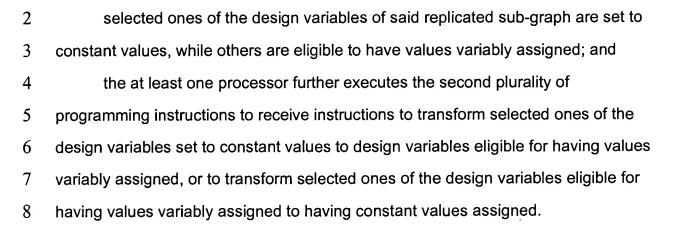
1 21.   The apparatus of claim 16, wherein the at least one processor further

2 executes the second plurality of programming instructions to receive identification of

3 a point or an area of the second mechanical design to reuse the subpart of the first

4 mechanical design in the second mechanical design.

1 22.   The apparatus of claim 21, wherein

2   said second dependent graph includes a second plurality of nodes

3 correspondingly represent a second plurality of design variables of the second

4 mechanical design, and a second plurality of arcs linking the second plurality of

5 nodes in accordance with the second plurality of design variables' dependency on

6 one another; and

7   the at least one processor further executes the second plurality of

8 programming instructions to correlate the received identification of the point/area to

9 one or more nodes of said second plurality of nodes directly associated with the

10 identified point/area, and to attach the replicated sub-graph to the second

11 dependent graph by selectively linking nodes of the replicated sub-graph to the

12 correlated nodes of the second dependent graph.

1   23.   The apparatus of claim 16, wherein the at least one processor consists of a

2   processor executing both the first and second plurality of programming instructions.

1   24.   The apparatus of claim 16, wherein the at least one processor comprises a

2   first and a second processor communicatively coupled to each other to

3   correspondingly execute the first and second plurality of programming instructions.

1   25.   An apparatus comprising:

2   means to replicate a subset of a first modeling representation of a first

3   mechanical design responsive to instructions identifying a subpart of the first

4   mechanical design;

5   means to merge the replicated subset into a second modeling representation

6   of a second mechanical design to reuse the identified subpart of the first mechanical

7   design in the second mechanical design.

1   26.   A method comprising the steps of:

2   replicating a subset of a first modeling representation of a first mechanical

3   design responsive to instructions identifying a subpart of the first mechanical design;

4   and

5   merging the replicated subset into a second modeling representation of a

6   second mechanical design to reuse the identified subpart of the first mechanical

7   design in the second mechanical design.

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